

Applicant : Joachim Kröll, Hermann Franzen and Mathias Dobner  
For : LOADING AND UNLOADING STATION IN A  
SEA PORT OR RIVER PORT  
International Filing Date : 12 February 2004  
International Application No. : PCT/EP2004/001291  
Preliminary Amendment  
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**In the Specification.**

Applicants wish to amend the specification as follows:

Please replace the heading before the first paragraph on page 1 with the following new heading:

**Specification BACKGROUND OF THE INVENTION**

The invention concerns a handling facility at a seaport or inner harbor, especially for ISO containers, with a container terminal arranged alongside a wharf, consisting of individual storage modules arranged in rows, and at least one loading facility interacting with the storage modules for the cargo handling to and from a ship lying at the wharf, wherein at least one elevated stacking crane per storage module takes charge of the receiving, the horizontal transporting, and the stacking of the containers and interacts with cross transporters acting independently of each other and able to travel on a different horizontal level transverse to the individual storage modules, being responsible for the horizontal transporting of containers between the storage modules.

Please insert the following heading on page 2, before paragraph 2, as follows:

**SUMMARY OF THE INVENTION**

Starting from a handling facility as described above, the problem of the present invention is to substantially increase the handling efficiency and the performance of an automated container terminal.

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Please replace the fourth paragraph on page 2 with the following amended paragraph:

~~According to one favorable feature of the invention, each~~ Each cross transporter ~~is~~ may be outfitted with a transfer or receiving device for handling of a container to or from an interim storage station. As a result, the cross transporter is not loaded directly by the stacking cranes, but instead is serviced from the interim storage station, which is arranged parallel to the railways.

Please replace the sixth paragraph on page 2 with the following amended paragraph:

In order to enable a smooth transfer of the container placed on a load carrier to the interim storage station, ~~according to another feature of the invention~~ the interim storage stations may be configured as angle brackets which reach freely at least in part across the railway and the cross transporter, so that the load carrier can travel underneath the interim storage station when the cross transporter is positioned beneath the interim storage station, and open slots running sideways are provided in the angle brackets in the direction of the load carrier, which are engaged by vertical lifting devices for the container that are arranged on the load carrier and that reach underneath the support points of the container. ~~Preferably, the~~ The vertical lift devices of the load support ~~are~~ may be configured as hydraulic piston and cylinder units, which are arranged at the standard spacing of the corner fittings of ISO containers on the load support.

Please replace paragraphs 2-6 on page 3 with the following amended paragraphs:

~~An especially high handling efficiency can be achieved when, according to an especially important feature of the invention, two~~ Two railways running parallel to each other may be provided that traverse the container yard transverse to the storage modules, and are joined together at the head

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side by change-over devices for the cross transporters, in order to enable a switching of the cross transporters from one of the railways to the other parallel railway. ~~Thanks to this arrangement, both~~  
Both railways can be optimally utilized in closed circuit, and the cross transporters traveling on a common level and in a fixed direction of turning cover the entire width of the yard and reach any given storage module, and at the end points on the top side of the railways they can be switched to return on the parallel railway. The cross transporter itself is not loaded directly by the stacking crane, but is automatically serviced from the interim storage stations, which are arranged parallel to the railways.

Because the railways travel across the entire width of the container yard, the truck driving lanes according to an aspect of the invention can travel underneath the railways and the truck loading lanes can travel underneath next to the interim storage stations. In this way, loading and unloading of trucks is possible at the loading lanes over the entire width of the terminal.

According to an aspect of the invention, the change-over devices each consist of a bridge-like steel structure with lengthwise running rails, whose gauges correspond to those of the railways for the cross transporters, and are outfitted with rail travel mechanisms at the front end, which can travel on elevated railways transverse to the railways of the cross transporters at the head side and between the two parallel railways of the cross transporters and move into end positions where the rails on the bridge-like steel structure are aligned with one of the railways for the cross transporters.

Since the cross transporter should drive onto and off from the change-over device as jolt-free as possible, before the cross transporter passes over, the gaps provided between the railways of the cross transporter and the change-over device are may be automatically closed with corresponding horizontally and vertically positioned adapters.

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~~Preferably, the~~ The interim storage stations ~~are~~ may be secured with the vertical legs of the angle brackets to the side of the girders for the railways and ~~are~~ may be designed to accommodate up to four containers per storage module. In this way, a sufficient buffer function of the interim storage station is achieved.

Please replace paragraphs 1 and 2 on page 4 with the following amended paragraphs:

~~The novel handling facility for a container terminal at seaport or inner harbor satisfies the indicated conditions.~~ Within the container terminal, a continuous distribution of the containers to all storage modules is possible by means of cross transporters. A rather large number of cross transporters travels on preferably two parallel railways with two change-over devices at the head stations, which enable a switching of the cross transporters and improve their availability. The cross transporters are timed to travel in a single fixed direction of turning and on the same horizontal level. The cross transporters are not directly loaded by the stacking cranes, they are automatically serviced from the interim storage stations, which are arranged parallel to the railways. There are at least four truck loading and driving lanes underneath the railways and the interim storage stations, so that a large number of trucks can be serviced at the same time.

~~In summary,~~ Particular aspects of the invention may achieve the following benefits over the state of the art result:

Please replace paragraph 9 on page 4 with the following amended paragraph:

A sample embodiment of the invention is depicted in the drawing and shall be described hereafter.

~~It shows:~~

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Please insert the following heading on page 4, before paragraph 10, and amend paragraphs 10-17 as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1, is a layout of a container terminal according to the invention,

Figure 2, is a detail of Figure 1 from the region of the yard entrance and exit,

Figure 3, is a detail of Figure 1 from the zone of the truck turning station,

Figure 4, is a detail of Figure 1 as a top view of the region of the yard entrance or exit,

Figure 5, is a cross section through the interim storage station and a view of the cross transporter,

Figure 6, is a cross section through the loading and unloading zone in the container yard,

Figure 7, is a side view of the yard entrance and exit, and

Figure 8, is a front view of the change-over device at the yard entrance and exit.

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Please insert the following heading on page 5 before paragraph 1:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows in a perspective drawing a compact container terminal 1 and a container ship 3 lying at dock 2. Mobile harbor cranes 4 load and unload the containers 5 and transport them to and from the transfer station 6. The transfer station forms the interface between the stacking crane 7 and the mobile harbor cranes 4. The number of stacking cranes used per storage module 8 depends on the particular length of the storage module 8. Trucks 9 are guided through the terminal gate 10 via the truck driveway 11 to the yard entrance or exit 12, through the storage modules 8 onto the turning station 13, and back again to the terminal gate. On the way between the yard entrance or exit 12 and the turning station 13, the trucks are loaded and unloaded at the loading stations assigned by the operating personnel.

Please replace paragraphs 1-3 on page 6 with the following amended paragraphs:

~~At the~~The left side of Figure 5 ~~one notices~~illustrates the load carrier 18.2 on the cross transporter 18 in the "cross transport travel" position. Eight hydraulic load supports 18.4 (shown here for 20 foot and 40 foot containers) are provided at the standard spacing of the container corner fittings. The container 17 stands with its corner fittings 17.1 on four nonactivated hydraulic load supports 18.4. In this position, the cross transporter 18 can travel along the railways 21 and 22.

~~At the~~The right side of the ~~drawing one notices~~Figure 5 illustrates the load carrier 18.2 on the cross transporter 18 in the "interim storage station" position. The container 17 stands with its corner fittings 17.1 on four activated hydraulic load supports 18.4, which penetrate into the slotlike openings in the horizontal angle leg of the interim storage station, arranged at the standard spacing of the container corner fittings. In this position, the interim storage station 16 can be loaded and unloaded.

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Figure 6 shows a cross section through the loading and unloading zone in the container yard. ~~One can recognize~~ illustrating the passageway in the transverse direction through a storage module 8. The trucks 9.1 and 9.3 are located on the driving lanes 11.1 and 11.3, the trucks 9.2 and 9.4 on the loading lanes 11.2 and 11.4. The container 17, previously placed in the angle-shaped interim storage station 16, is taken by the stacking crane 7, running on the railway 15, to the truck 9.4 and set down there.

Please replace paragraph 6 on page 6 with the following amended paragraph:

Figure 8, ~~finally~~, shows a front view of the first change-over device 19 at the yard entrance or exit. The figure shows the first change-over device 19 on the railway 23, a cross transporter 18 with its load carrier 18.2 before or after switching track to or from the first railway 22, and the interim storage station 16 which is angular in cross section. Beneath the change-over device 19, trucks 9.1 and 9.3 are represented on the driving lanes 11.1 and 11.3.